QUARTERLY REPORT
NASA CONTRACT NAS5-31368
FOR MODIS TEAM MEMBER STEVEN W. RUNNING
ASSOC. TEAM MEMBER RAMAKRISHNA R. NEMANI
SOFTWARE ENGINEER JOSEPH GLASSY
15 OCTOBER 1996

Two primary activities have monopolized this quarter. We
revised and resubmitted our ATBD's for MOD 15 - FPAR/LAI, and
MOD 17 - PSN/NPP. The second major project was completing
the EOS Science Plan Chapter 7 on Land Ecosystems and
Hydrology. The chapter can be read at:

http://www.forestry.umt.edu/ntsg/projects/global/EOS_land/

Some other details are below.

Activities of Team Member S.W.Running

Meetings Attended:
International Global Observing System meeting, Wash, DC.
June, 1996

EOS Science Executive Meeting, Chicago, September 1996.

National Center for Ecological Analysis and Synthesis, Board
of Directors meeting, October,   1996

MODIS Science Team meeting, Greenbelt, MD, October 1996

Activities of Associate Team Member R.R. Nemani

MODIS Science:

-Revised and submitted MODIS PSN/NPP and FPAR/LAI ATBD.

-An extensive analysis of the influence of canopy
structural/optical properties on spectral reflectance was
conducted using a 3-D radiative
transfer model. This analysis helped us to identify six
vegetation canopies that are significantly different from
each other. These are shrubs, grass/cereal crops, broadleaf
crops, broadleaf forests, needle forests and savanna.

-Global Ecosystem Simulation System was used to compute and
map net primary production and heterotrophic respiration at
0.5x0.5 resolution. The results from this analysis are being
compared against results from other models and observations.

WORK ACCOMPLISHED

* Surface temperature trend analysis using Pathfinder AVHRR
data for the period of 1982-1990.

* Compared LAI/FPAR maps from Pathfinder data with ISLSCP datasets.
* Analysed surface climate trends during 1949-1995 over boreal forests to test for the finger prints of climate warming.

WORK IN PROGRESS

* Compiling additional leaf spectra and generating responses for MODIS wavelength bands.
* Deriving the six biome types globally using 1km AVHRR data.

MODIS Science Team meeting, Greenbelt, MD, October 1996

ACTIVITIES OF J. M.Glassy, MODIS Software Engineer: October 15, 1996

OBJECTIVES

My objectives during this time period were to 1) contribute to the development of a new generation of Algorithm Theoretical Basis Documents (ATBD) for MODIS Land Products MOD15 (FPAR, LAI) and MOD17 (PSN,NPP), 2) continue the source code changes required for implementing the new PGS metadata standard into our product codes, and 3) oversee refinements to our Science Compute Facility MODIS Compute Ring at the University of Montana, in the following emphasis areas: improved network services, more efficient RAID deployment, and evaluation of next generation compute servers.

WORK ACCOMPLISHED

MOD15: FPAR/LAI Product

The dominant activity during this period focused on algorithm design refinements associated with the addition of a new team member ñ Ranga Myneni ñ an expert in radiative transfer modeling. Further tests were conducted in the implementation of the empirical (backup) algorithm, as well as further performance and implemention tests on the lookup table (LUT). Coding of the main algorithm for V1 delivery is proceeding and is expected to be complete in late 4th quarter of 1996. Also in this period, our official MOD15 V1 File Specification was updated to reflect recent changes. A draft SCF level Q/A plan was prepared, which more specifically addressed Q/A procedures we've implemented in MOD15 for V1. These changes include trimming the latitude and longitude bin centers image planes from our product due to advances in the L2G LBIN library.

MOD17: PSN/NPP Product

On the MOD17 algorithm, a trial daily surface climatology data set was produced to include the key variables required by the model ñ near surface minimum and maximum air temperature, incident shortwave radiation, specific humidity, and accumulated precipitation. Coding continues on the three main software modules making of the MOD17 suite: clim_psn, (for temporal aggregation of the DAO climate database), psn_npp (the main net primary productivity algorithm), and aggr_psn (the post-processor for spatially degenerating the 1KM outputs to the coarse geographic projection climate modeling grid).

The MOD17 ATBD was also revised and re-submitted during this period, to bring it up to date with recent refinements in the algorithm implementation. The new prototype SCF Q/A Plan also addressed Q/A procedures in the MOD17 algorithm.

MODIS UM SCF Compute Ring Infrastructure

During this period, the University of Montana School of Forestry assigned our group a dedicated compute facility room, and we moved the bulk of our MODIS Compute Ring components into this renovated room. New additions to the MODIS Compute Ring included an evaluation compute server from Digital Equipment Corporation. This unit is a DEC Alphaserver Model 4100 3-way SMP compute server, set up with (3) 400 mhz Alpha 21164 CPUs and 1G of core memory. The DEC Alpha is being evaluated for its very high performance floating capability, for running the radiative transfer model and other compute intensive tasks.

During the July to October 1996 timeframe, the new SDPTK version 5.1 software toolkit (with patches) was retrieved, built and tested at the SCF, in addition to (2) releases of the NCSA HDF Library ñ version 4.0r1p1, and 4.0r2p1. Corresponding software bridgework between the NSCA libraries and our internal MODIS-Univ. of Montana (MUM) API were also developed during this period.

ON GOING ACTIVITIES

MODIS UM SCF Compute Ring Infrastructure

Further additions to our SCF Compute Ring planned for this year include an additional 128G to 256G of RAID 0/3/5 disk store, refinements to the network service via installation of a fiber trunk up to our local Cisco C5K intelligent switch, and acquisition of the DEC Alphaserver if funding permits.

MEETINGS ATTENDED

1)   MODIS MODLAND-SDST Meeting, July 11-12, 1996

2)   MODIS Science Advisory Panel (SAP) Meeting, September 4-6, 1996.

PUBLICATIONS

Hunt, E.R., Jr., S.C. Piper, R. Nemani, C.D. Keeling, R.D. Otto, and S.W. Running. (1996). Global net carbon exchange and intra-annual atmospheric CO2 concentrations Predicted by an Ecosystem Process Model and Three-Dimensional Atmospheric Transport Model. Global Biogeochemical Cycles 10(3): 431-456.

Nemani, R.R., and S.W. Running. 1996a. Implementation of a hierarchical global biome classification in biospheric models. Journal of Vegetation Science 7:337-346.

Nemani, R.R., and S.W. Running. 1996b. Land cover classification using multi-temporal red, nir and thermal-ir AVHRR data. Ecological Applications (in press).

Running, S.W., R.Nemani, K.Hibbard, and G. Churkina. (1996). The influence of landcover change on global terrestrial biogeochemistry. Pp. 6-9: IGBP/BAHC SSC Environment Agency of Japan. Proceedings of IGBP/BAHC-LUCC Joint Inter-Core Projects Symposium on Interactions Between the Hydrological Cycle and Land Use/Cover. Kyoto, Japan